

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C.20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 29 May 2000 (29.05.00)	
International application No. PCT/GB99/03288	Applicant's or agent's file reference 39766
International filing date (day/month/year) 06 October 1999 (06.10.99)	Priority date (day/month/year) 06 October 1998 (06.10.98)
Applicant NICOL, Christine et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
05 May 2000 (05.05.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Juan Cruz

Telephone No.: (41-22) 338.83.38

# PATENT COOPERATION TREATY

## PCT

REC'D 11 JAN 2001

WIPO

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39766/NT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/03288	International filing date (day/month/year) 06/10/1999	Priority date (day/month/year) 06/10/1998
International Patent Classification (IPC) or national classification and IPC A61K35/78		
Applicant MARS U.K. LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  05/05/2000	Date of completion of this report  09.01.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Schnack, A  Telephone No. +49 89 2399 8149  

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/03288

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

### Description, pages:

1-20 as originally filed

### Claims, No.:

1-33 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/03288

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 11-25, 28-33.

because:

- ☒ the said international application, or the said claims Nos. 11-25, 28-33 relate to the following subject matter which does not require an international preliminary examination (*specify*):  
**see separate sheet**
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	9, 10, 11-26
	No:	Claims	1-8, 27-30
Inventive step (IS)	Yes:	Claims	none
	No:	Claims	1-30
Industrial applicability (IA)	Yes:	Claims	1-10, 26-27. For claims 11-25, 28-33 see separate sheet.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/03288

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No: Claims

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

Reference is made to the following documents:

- D1: Applied Animal Behaviour Science, vol. 48, no. 1-2, 1996, pp. 25-35.
- D2: WO 96 207 09
- D3: Equine veterinary Journal, vol. 30, no. 2, 1998, pp. 139-143.
- D4: Journal of Animal Science, vol. 45, no. 1, 1977, pp. 87-93
- D5: Animal Science, vol. 66, no. 2, 1998, pp. 475-481
- D6: WO 98 436 44
- D7: Internet: [http://www.blood-horse.com/horse\\_health/healthwatch0629.html](http://www.blood-horse.com/horse_health/healthwatch0629.html)
- D8: Internet: <http://www.ker.com/supplements/Neighlox.html>

D7 and D8 were not cited in the search report.

### ***Section III***

#### ***Non-establishment of opinion***

Claims 11-25, 28-30 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT. Consequently, no opinion will be formulated with respect to the industrial applicability of the subject-matter of these claims (Article 34(4)(a)(i) PCT).

### ***Section V***

#### ***V.1 Novelty***

Remarks under Article 33(2) PCT:

Present claims 1-10 are directed to non-pharmaceutical, (claim 1) and pharmaceutical (claim 2) compositions comprising fat, fibre and optionally a stomach antacid. In this context it is pointed out that the intended purpose of a pharmaceutical composition, i.e. "for use in the treatment, prevention or amelioration of animal stereotypy", is not considered to be a technical feature that would distinguish such a composition from any known pharmaceutical preparation comprising the same ingredients.

Thus, the only technical feature of present claims 1 and 2 is a composition comprising fat and fibre. A composition comprising fat and fibre, even in the amounts specified in the dependent claims, and even for use as pharmaceuticals is obviously not novel,

since food comprising normal nutritional ingredients such as fat and fibre is always given to animals in order to keep them in a good physical and physiological condition, and the amounts mentioned in the claims appear to be within the normal ranges of food constituents for animals. Thus, it does not appear to be feasible to distinguish between non-pharmaceutical and pharmaceutical compositions, when the compositions only comprise normal food ingredients such as fat and fibre. Even a normal bread or any other normal food composition even for humans comprising fat and fibre would appear to fall within the scope of at least present claim 1. Thus, it does not appear to be possible to obtain patent protection for a composition for which the only technical features are the presence of certain amounts of fat and/or fibre.

Moreover, it appears that normal horse food such as the concentrate mentioned in e.g. D4, table 1, or for that matter normal hay, which must include some fat, would fall within the scope of present claims 1-10, even though the amounts of fat and fibres are not explicitly mentioned.

Thus, the documents D1, D2, D3, D4, D5, D6 (see the passages mentioned in the search report) all mention horse food, which appear to comprise fibre and fat. Thus, the subject matter of present claims 1-8 appears to lack novelty with respect to these documents.

It appears that the subject matter of present claims 9 and 10 is novel with respect to the cited documents, since none of the documents appear to disclose a composition comprising an antacid as specified in these claims.

Present claims 11-23 relate to a method for treating or preventing animal stereotypy, which comprises controlling the stomach pH. It appears that none of the cited documents explicitly mention treating stereotypy by controlling the stomach pH. Thus, the subject matter of present claims 11-23 appears to be novel with respect to the cited documents.

Present claims 24-25 relate to a method for treating animal stereotypy by preventing ulcer formation. Thus, applicant appears to have found a relationship between ulcers and stereotypic behaviour. This relation does not appear to be directly and explicitly described in the cited prior art documents, for which reason the subject matter of

present claims 24 and 25 appears to be novel. However, it appears that applicant has not shown that treatment of ulcers with a composition according to present claims 1-10 has any beneficial effect on ulcers, (cf. present application, page 16, lines 3-5), rather on the contrary. Thus, this question has to be clarified in the subsequent national/regional phase.

Also the subject matter of present claim 26, which relates to further medical use of stomach antacid compositions for the treatment of animal stereotypy appears to be novel with respect to the cited documents. However, the subject matter of present claims 27-30 does not appear to be novel, since the compositions do not necessarily comprise a stomach antacid. Thus, the use of a composition comprising fat and fibre for the prevention/treatment of stereotypy is not novel since such feed is normal and all feed is given in order to provide the animal with the best food so as to avoid unwanted behaviour. Moreover, the subject matter of present claims 27-30 is inadequately experimentally supported, since the present application does not appear to provide evidence that feed without a stomach antacid has any beneficial effects on stereotypic behaviour.

***V.2. Inventive step***

Remarks under Article 33(3) PCT:

The present subject matter appears to be based on the finding that there appears to be a link between low stomach pH and behavioural abnormality, (cf. present application, page 4, lines 19-20). Moreover, it appears that the applicant also alleges to have observed a novel and beneficial effect on stereotypic behaviour when the feeding is rich in fibre and fat. However, no evidence for such allegation appears to be presented, especially not for the enrichment in fat. The fact that inadequate feed is a cause of stereotypy is well known, (see e.g. D1, page 34, 2nd paragraph), and it is also known that feed, which is rich in fibre is beneficial for the behaviour of horses, (see e.g. D2, page 2, lines 24-28, D3, page 139, the summary and 2nd col., 2nd paragraph and page 142, discussion and D5, introduction and page 479, 1st col., lines 5-13). Thus, no inventive features can be seen in the food compositions comprising high amounts of fibre or fat.

Neither does it appear that an inventive step can be acknowledged for the observation



that there appears to be a link between low stomach pH and behavioural abnormality, because it is already known that there exists a link between cecal/hind-gut pH and behaviour of horses, (see e.g. D3, pages 142-143 "Discussion", D4, pages 89-92 "Results and discussion", especially page 91, last paragraph - page 92, first paragraph and cf. present description, page 2, line 30 - page 3, line 33). Thus, the administration of agents, which raise the cecal/hind-gut pH are also agents, which raise the stomach pH, (cf. present application, page 6, lines 32 - page 7, line 9 and cf. present application, page 18, line 33 - page 19, line 2). Thus, any measure to raise the stomach and gut pH appears to interchangeable. Moreover, if an increased pH in the gut leads to beneficial therapeutic results, it does not appear to be surprising that also an increase in stomach pH is beneficial, since stomach pH and gut pH appear to be directly dependent of each other. In conclusion, the measures to raise stomach pH as described on page 6, line 32 - page 7, line 9 are known measures to raise the pH of the stomach and gut, and since the beneficial therapeutic effect of an increased gut pH on the behaviour of horses is known, no inventive concept can be seen the observation that stomach pH and behaviour is linked. Thus, novel subject matter falling within the scope of present claims 1-30 does not appear to involve an inventive step.

Moreover, Neigh-Lox is known to restore normal stomach function in the horse and to compensate for the reduced saliva production in the stabled horse, (see D7 and D8, the entire documents). Thus, since it is assumed that reduced saliva production may contribute to stereotypic behaviour, (see e.g. D3, page 142, last paragraph), it does not appear to require inventive skills to administer Neigh-Lox, which is known to compensate for reduced saliva production.

### ***V.3. Industrial Applicability***

Remarks under Article 33(4) PCT:

For the assessment of the present claims 11-25 and 28-30 on the question whether they are industrially applicable, no unified criteria exist in the PCT Contracting States. The patentability can also be dependent upon the formulation of the claims. The EPO, for example, does not recognize as industrially applicable the subject-matter of claims to the use of a compound in medical treatment, but may allow, however, claims to a known compound for first use in medical treatment and the use of such a compound for the manufacture of a medicament for a new medical treatment.

***Section VIII***

Remarks under Article 5 and 6 PCT:

The present experimental data appears to be very unclear; perhaps especially because it is not clear what is meant by "control" in the tables 2 and 3. Moreover, the results from the investigations are not clear; e.g. page 15 states (lines 3-6): Four of the 13 crib-biting foals had positive...etc." However, it remains unclear to which feeding group (diet A or (Diet A + Neighlox) these four foals belong.

Moreover, the present application only provides evidence that Neigh-Lox, which is a marketed product known to neutralise gastric acid, has any effect on stereotypic behaviour. No evidence is presented that other antacids, which have an different mechanism of action have any effect on behaviour. Thus, sufficiency of disclosure in the sense of Article 5 PCT does not appear to be presented.

Present claim 1 and 2 appears to lack an essential feature; namely the presence of a stomach antacid, (cf. present application, page 18, lines 17-21).

Present claims 31-33 are so unclear and insufficiently disclosed that they cannot be allowed under Article 6 PCT and no examination has been made for these claims.

# PATENT COOPERATION TREATY

NTM

6.4.2001

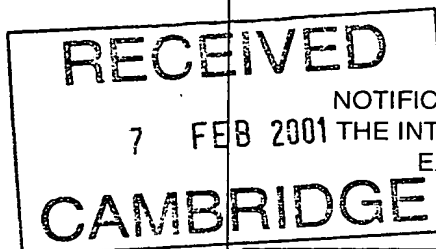
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File on Cambs

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

MARLOW, N.S.  
Reddie & Grose  
16 Theobalds Road  
London WC1X 8PL  
GRANDE BRETAGNE



PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing  
(day/month/year) 09.01.2001

Applicant's or agent's file reference  
39766/NT

## IMPORTANT NOTIFICATION

International application No.  
PCT/GB99/03288

International filing date (day/month/year)  
06/10/1999

Priority date (day/month/year)  
06/10/1998

Applicant  
MARS U.K. LIMITED et al.

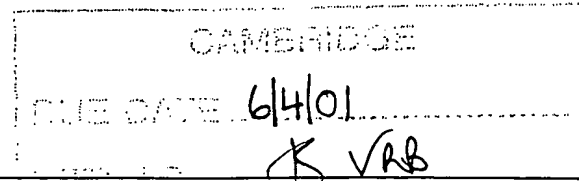
1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

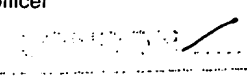
For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.



Name and mailing address of the IPEA/

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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 39766/NT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB99/03288	International filing date ( <i>day/month/year</i> ) 06/10/1999	Priority date ( <i>day/month/year</i> ) 06/10/1998
International Patent Classification (IPC) or national classification and IPC A61K35/78		
Applicant MARS U.K. LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 9 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  05/05/2000	Date of completion of this report  09.01.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Schnack, A  Telephone No. +49 89 2399 8149 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/03288

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

### Description, pages:

1-20 as originally filed

### Claims, No.:

1-33 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/03288

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

### III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

- ☐ the entire international application.
- ☒ claims Nos. 11-25, 28-33.

because:

- ☒ the said international application, or the said claims Nos. 11-25, 28-33 relate to the following subject matter which does not require an international preliminary examination (*specify*):  
**see separate sheet**
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.
- ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.

### V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 9, 10, 11-26
	No: Claims 1-8, 27-30
Inventive step (IS)	Yes: Claims none
	No: Claims 1-30
Industrial applicability (IA)	Yes: Claims 1-10, 26-27. For claims 11-25, 28-33 see separate sheet.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/03288

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No: Claims

2. Citations and explanations  
see separate sheet

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
see separate sheet

Reference is made to the following documents:

- D1: Applied Animal Behaviour Science, vol. 48, no. 1-2, 1996, pp. 25-35.
- D2: WO 96 207 09
- D3: Equine veterinary Journal, vol. 30, no. 2, 1998, pp. 139-143.
- D4: Journal of Animal Science, vol. 45, no. 1, 1977, pp. 87-93
- D5: Animal Science, vol. 66, no. 2, 1998, pp. 475-481
- D6: WO 98 436 44
- D7: Internet: [http://www.blood-horse.com/horse\\_health/healthwatch0629.html](http://www.blood-horse.com/horse_health/healthwatch0629.html)
- D8: Internet: <http://www.ker.com/supplements/Neighlox.html>

D7 and D8 were not cited in the search report.

### ***Section III***

#### ***Non-establishment of opinion***

Claims 11-25, 28-30 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT. Consequently, no opinion will be formulated with respect to the industrial applicability of the subject-matter of these claims (Article 34(4)(a)(i) PCT).

### ***Section V***

#### ***V.1 Novelty***

Remarks under Article 33(2) PCT:

Present claims 1-10 are directed to non-pharmaceutical, (claim 1) and pharmaceutical (claim 2) compositions comprising fat, fibre and optionally a stomach antacid. In this context it is pointed out that the intended purpose of a pharmaceutical composition, i.e. "for use in the treatment, prevention or amelioration of animal stereotypy", is not considered to be a technical feature that would distinguish such a composition from any known pharmaceutical preparation comprising the same ingredients.

Thus, the only technical feature of present claims 1 and 2 is a composition comprising fat and fibre. A composition comprising fat and fibre, even in the amounts specified in the dependent claims, and even for use as pharmaceuticals is obviously not novel,



since food comprising normal nutritional ingredients such as fat and fibre is always given to animals in order to keep them in a good physical and physiological condition, and the amounts mentioned in the claims appear to be within the normal ranges of food constituents for animals. Thus, it does not appear to be feasible to distinguish between non-pharmaceutical and pharmaceutical compositions, when the compositions only comprise normal food ingredients such as fat and fibre. Even a normal bread or any other normal food composition even for humans comprising fat and fibre would appear to fall within the scope of at least present claim 1. Thus, it does not appear to be possible to obtain patent protection for a composition for which the only technical features are the presence of certain amounts of fat and/or fibre.

Moreover, it appears that normal horse food such as the concentrate mentioned in e.g. D4, table 1, or for that matter normal hay, which must include some fat, would fall within the scope of present claims 1-10, even though the amounts of fat and fibres are not explicitly mentioned.

Thus, the documents D1, D2, D3, D4, D5, D6 (see the passages mentioned in the search report) all mention horse food, which appear to comprise fibre and fat. Thus, the subject matter of present claims 1-8 appears to lack novelty with respect to these documents.

It appears that the subject matter of present claims 9 and 10 is novel with respect to the cited documents, since none of the documents appear to disclose a composition comprising an antacid as specified in these claims.

Present claims 11-23 relate to a method for treating or preventing animal stereotypy, which comprises controlling the stomach pH. It appears that none of the cited documents explicitly mention treating stereotypy by controlling the stomach pH. Thus, the subject matter of present claims 11-23 appears to be novel with respect to the cited documents.

Present claims 24-25 relate to a method for treating animal stereotypy by preventing ulcer formation. Thus, applicant appears to have found a relationship between ulcers and stereotypic behaviour. This relation does not appear to be directly and explicitly described in the cited prior art documents, for which reason the subject matter of

present claims 24 and 25 appears to be novel. However, it appears that applicant has not shown that treatment of ulcers with a composition according to present claims 1-10 has any beneficial effect on ulcers, (cf. present application, page 16, lines 3-5), rather on the contrary. Thus, this question has to be clarified in the subsequent national/regional phase.

Also the subject matter of present claim 26, which relates to further medical use of stomach antacid compositions for the treatment of animal stereotypy appears to be novel with respect to the cited documents. However, the subject matter of present claims 27-30 does not appear to be novel, since the compositions do not necessarily comprise a stomach antacid. Thus, the use of a composition comprising fat and fibre for the prevention/treatment of stereotypy is not novel since such feed is normal and all feed is given in order to provide the animal with the best food so as to avoid unwanted behaviour. Moreover, the subject matter of present claims 27-30 is inadequately experimentally supported, since the present application does not appear to provide evidence that feed without a stomach antacid has any beneficial effects on stereotypic behaviour.

**V.2. Inventive step**

Remarks under Article 33(3) PCT:

The present subject matter appears to be based on the finding that there appears to be a link between low stomach pH and behavioural abnormality, (cf. present application, page 4, lines 19-20). Moreover, it appears that the applicant also alleges to have observed a novel and beneficial effect on stereotypic behaviour when the feeding is rich in fibre and fat. However, no evidence for such allegation appears to be presented, especially not for the enrichment in fat. The fact that inadequate feed is a cause of stereotypy is well known, (see e.g. D1, page 34, 2nd paragraph), and it is also known that feed, which is rich in fibre is beneficial for the behaviour of horses, (see e.g. D2, page 2, lines 24-28, D3, page 139, the summary and 2nd col., 2nd paragraph and page 142, discussion and D5, introduction and page 479, 1st col., lines 5-13). Thus, no inventive features can be seen in the food compositions comprising high amounts of fibre or fat.

Neither does it appear that an inventive step can be acknowledged for the observation

that there appears to be a link between low stomach pH and behavioural abnormality, because it is already known that there exists a link between cecal/hind-gut pH and behaviour of horses, (see e.g. D3, pages 142-143 "Discussion", D4, pages 89-92 "Results and discussion", especially page 91, last paragraph - page 92, first paragraph and cf. present description, page 2, line 30 - page 3, line 33). Thus, the administration of agents, which raise the cecal/hind-gut pH are also agents, which raise the stomach pH, (cf. present application, page 6, lines 32 - page 7, line 9 and cf. present application, page 18, line 33 - page 19, line 2). Thus, any measure to raise the stomach and gut pH appears to interchangeable. Moreover, if an increased pH in the gut leads to beneficial therapeutic results, it does not appear to be surprising that also an increase in stomach pH is beneficial, since stomach pH and gut pH appear to be directly dependent of each other. In conclusion, the measures to raise stomach pH as described on page 6, line 32 - page 7, line 9 are known measures to raise the pH of the stomach and gut, and since the beneficial therapeutic effect of an increased gut pH on the behaviour of horses is known, no inventive concept can be seen the observation that stomach pH and behaviour is linked. Thus, novel subject matter falling within the scope of present claims 1-30 does not appear to involve an inventive step.

Moreover, Neigh-Lox is known to restore normal stomach function in the horse and to compensate for the reduced saliva production in the stabled horse, (see D7 and D8, the entire documents). Thus, since it is assumed that reduced saliva production may contribute to stereotypic behaviour, (see e.g. D3, page 142, last paragraph), it does not appear to require inventive skills to administer Neigh-Lox, which is known to compensate for reduced saliva production.

### ***V.3. Industrial Applicability***

Remarks under Article 33(4) PCT:

For the assessment of the present claims 11-25 and 28-30 on the question whether they are industrially applicable, no unified criteria exist in the PCT Contracting States. The patentability can also be dependent upon the formulation of the claims. The EPO, for example, does not recognize as industrially applicable the subject-matter of claims to the use of a compound in medical treatment, but may allow, however, claims to a known compound for first use in medical treatment and the use of such a compound for the manufacture of a medicament for a new medical treatment.

***Section VIII***

Remarks under Article 5 and 6 PCT:

The present experimental data appears to be very unclear; perhaps especially because it is not clear what is meant by "control" in the tables 2 and 3. Moreover, the results from the investigations are not clear; e.g. page 15 states (lines 3-6): Four of the 13 crib-biting foals had positive...etc." However, it remains unclear to which feeding group (diet A or (Diet A + Neighlox) these four foals belong.

Moreover, the present application only provides evidence that Neigh-Lox, which is a marketed product known to neutralise gastric acid, has any effect on stereotypic behaviour. No evidence is presented that other antacids, which have an different mechanism of action have any effect on behaviour. Thus, sufficiency of disclosure in the sense of Article 5 PCT does not appear to be presented.

Present claim 1 and 2 appears to lack an essential feature; namely the presence of a stomach antacid, (cf. present application, page 18, lines 17-21).

Present claims 31-33 are so unclear and insufficiently disclosed that they cannot be allowed under Article 6 PCT and no examination has been made for these claims.



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB99/03288 <b>(22) International Filing Date:</b> 6 October 1999 (06.10.99) <b>(30) Priority Data:</b> 9821790.4                      6 October 1998 (06.10.98)                      GB 9822563.4                      15 October 1998 (15.10.98)                      GB <b>(71) Applicant (for all designated States except US):</b> MARS U.K. LIMITED [GB/GB]; 3D Dundee Road, Slough, Berkshire SL1 4LW (GB). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> NICOL, Christine [GB/GB]; Division of Animal Health & Husbandry, Dept. of Clinical Veterinary Science, Langford House, Langford, North Somerset BS40 5DU (GB). HARRIS, Patricia [GB/GB]; Charity Farm House, Hartest, Suffolk IP29 4NA (GB). <b>(74) Agent:</b> MARLOW, N., S.; Reddie & Grose, 16 Theobalds Road, London WC1X 8PL (GB).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> ANIMAL STEREOTYPY <b>(57) Abstract</b> <p>The invention provides compositions comprising fat, fibre and optionally a stomach antacid for use in the treatment, prevention or amelioration of animal stereotypy. Methods of treatment, prevention or amelioration of animal stereotypy which comprise controlling the stomach pH of an animal are also disclosed.</p>		

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- 1 -

### Animal Stereotypy

5           The present invention relates to the treatment, prevention or amelioration of animal stereotypies.

          Stereotypies are animal behavioural disorders. They are characterised by the performance of repetitive, invariant movements which have no obvious function. Equine  
10       stereotypies are of particular concern to owners of horses because the condition and performance of a horse which displays stereotypic behaviour is often adversely affected. This can substantially reduce the market value of a horse. Equine stereotypies include oral stereotypies such as crib-  
15       biting, wood chewing and wind-sucking, and locomotor stereotypies such as weaving and box-walking.

          The cause or causes of stereotypies are not known. This lack of knowledge has severely hampered the development of effective treatments and preventatives for stereotypies.  
20       In the abstract of a study by Christine Nicol and Amanda Waters, entitled "The treatment and Prevention of Equine Stereotypies", theories on possible causes of equine stereotypy are given. It is noted that stereotypies are frequently regarded as functionless pathologies of the  
25       nervous system. It has also been proposed that oral stereotypies serve some digestive function. Alternative views are that they are developed by an animal as a way of dealing with stress or boredom. A further theory is that animals learn to perform stereotypies by imitating other  
30       animals that perform them.

          Preventative measures for equine stereotypy based on these theories include use of stable toys to stop a horse from becoming bored or stressed, or isolation of a horse from other horses to stop it from learning stereotypies by  
35       imitation. Treatment of oral stereotypies such as cribbiting can involve more harsh measures, for example fitting

- 2 -

the horse with a collar to prevent it from crib-biting, or even surgery. Typically, surgery involves cutting the ventral neck muscles and/or the nerves that supply them. Other forms of control include aversion therapy. Here, the horse may be given an electric shock, or physical admonishment when it performs a stereotypy.

The above treatments or preventative measures have been found to be unsatisfactory. Use of stable toys has not been found to be an effective way of preventing equine stereotypy. Physical prevention of stereotypy, either by use of a collar or surgery, is not successful because the animal still has the urge to perform the behaviour. When the collar is removed, a horse will often perform a stereotypy more intensively than before. After surgery, the animal may still be able to perform the stereotypy by utilising other muscle groups. Preventatives such as social isolation, collar fitting, aversion therapy and surgery are undesirable.

In the abstract by Nicol and Waters referred to above, it is disclosed that an epidemiological study has shown that a significant number of horses develop stereotypic behaviour during the immediate post-weaning period. At weaning, the mare-foal bond is broken, but feeding and housing practices are often also changed at this time. The discovery that stereotypic behaviour often begins in the immediate post-weaning period has not so far led to a treatment or preventative for stereotypy because it is not clear which factor or combination of factors are significant in the onset of stereotypy.

Some studies have reported a link between behavioural abnormalities and acidity in the hindgut. Johnson *et al* (Equine Veterinary Journal 1998, 30(2), 139-43) noted a reduction in abnormal behaviour when horses were administered Founderguard (containing 1% virginiamycin). The most obvious explanation for this is stated to be reduced



- 3 -

acidosis in the hindgut caused by suppression by virginiamycin of lactic acid production in the hindgut.

Willard et al (Journal of Animal Science 1977, 54(1), 87-92) discloses that horses fed a concentrate diet with  
5 hourly infusions of sodium carbonate were observed to spend less time chewing wood and performing coprophagy (eating faeces) than horses fed a concentrate diet alone. The infusions of sodium carbonate significantly increased caecal pH. It was concluded that increased caecal acidity may  
10 influence the horse's desire to practice coprophagy and wood chewing.

The link between acidity in the hind gut and abnormal behaviour is also reported in WO 96/20709. This document discloses that starch, sugar or other carbohydrate which  
15 enters the hind gut is rapidly fermented to form lactic acid. This accumulation of lactic acid is stated to lead to a decline in hindgut pH which results in a wide range of biological consequences, including behavioural abnormalities. Methods of treatment or prophylaxis of  
20 adverse behaviour are disclosed in which an effective amount of an agent capable of preventing or controlling fermentative acidosis in the hindgut is administered to an animal.

Agents disclosed in WO 96/20709 as being capable of  
25 preventing or controlling fermentative acidosis are: antibiotic type compounds such as Virginiamycin (stated to be active against bacteria which produce lactic acid); enzymes which increase the digestion of carbohydrate and decrease the amount of rapidly fermentable carbohydrate  
30 passed to the hindgut; and clay preparations which bind specific ions to reduce the adverse effects of rapid fermentation of starch and other soluble carbohydrates in the gastrointestinal tract.

However, there are disadvantages to use of these  
35 agents. Virginiamycin is believed to have growth promoting activity. Consequently, this side effect may make

- 4 -

administration of Virginiamycin undesirable. The efficacy of enzymes which increase the digestion of carbohydrate is thought to be low because the rate of passage of enzymes through the gut can be rapid and their activity may be reduced by the low pH at certain points in the gut. It is likely that high levels of clay preparation are required to be effective in reducing hind gut pH. It may be undesirable to feed an animal the levels of clay that are required to have an effect.

It is also believed that hindgut acidity is not the principal cause of at least some stereotypies. Consequently, treatments which reduce hindgut acidity may not be wholly effective and may not have any effect at all on some stereotypies.

There is, therefore, still an urgent need to provide effective treatments, preventatives or amelioratives for stereotypy which do not involve any undesirable practices being performed on an animal being treated.

We have now appreciated that there is a link between low stomach pH and behavioural abnormality. This link has not previously been recognised and has provided new compositions and methods for the treatment, prevention or amelioration of animal stereotypy.

According to the invention there is provided a composition for use in the treatment, prevention or amelioration of animal stereotypy which comprises fat, fibre, and optionally a stomach antacid.

According to the invention there is also provided a pharmaceutical composition for use in the treatment, prevention or amelioration of animal stereotypy which comprises fat, fibre, and optionally a stomach antacid, together with a pharmaceutically acceptable carrier, excipient or diluent.

There is further provided according to the invention use of a composition according to the invention in the

- 5 -

manufacture of a medicament for the treatment, prevention, or amelioration of animal stereotypy.

5 There is also provided according to the invention use of a stomach antacid in the manufacture of a medicament for the treatment, prevention, or amelioration of animal stereotypy.

10 There is also provided according to the invention a method of treatment, prevention, or amelioration of animal stereotypy which comprises controlling the stomach pH of an animal.

The stomach pH of the animal may be controlled by administering a composition according to the invention to the animal.

15 There is also provided according to the invention a method of treatment, prevention, or amelioration of animal stereotypy which comprises preventing or reducing ulcer formation in the stomach of an animal or treating ulcers formed in the stomach of an animal. Ulcer formation may be prevented or reduced, and ulcers may be treated, by  
20 administering a composition according to the invention to the animal.

The amount of fat in compositions according to the invention is preferably from about 5% to about 20%, more preferably from about 8% to about 17%, by weight of the  
25 composition. Preferred fats are highly polyunsaturated vegetable oils. These fats tend to be highly palatable and easily mixed into other components of compositions of the invention. Examples are corn oil, soya oil, or processed canola oil. Other preferred fats are more saturated fats  
30 which are more stable and, therefore, are less prone to rancidity. Examples are coconut oil, palm oil, or sunflower oil.

"Fibre" as used herein means carbohydrate which is not digestible by mammalian enzymes. Some of the fibre may be  
35 fermentable by microbial enzymes. The amount of fibre in compositions according to the invention should be sufficient

- 6 -

to extend the amount of time spent chewing the composition by an animal administered with such a composition. The amount of fibre in a composition of the invention may be measured as the amount of crude fibre or neutral detergent fibre (NDF). The amount of crude fibre in compositions according to the invention is preferably from about 3.5% to about 35%, more preferably from about 10% to about 25%, by weight of the composition. The percentage of crude fibre in a sample is the percentage of the matter remaining in the sample after treatment with acid and alkali. This is measured by treating the defatted sample successively with boiling solutions of sulphuric acid and sodium hydroxide. The residue is filtered, washed, weighed and ashed. The loss of weight on ashing corresponds to the weight of fibre present in the test sample. The amount of NDF in compositions according to the invention is preferably from about 15% to about 70%, more preferably from about 25% to about 50%, by weight of the composition. This can be calculated using a method such as that described in Agric. Handbook No.379 (1970) Goering H.H. and Van Soest P.T. (USDA Washington D.C.).

Preferably at least some of the fibre is chopped fibre. Preferably the chopped fibre is about 1-7cm long. Preferably at least some of the fibre also has a high protein concentration. A preferred example is alfalfa hay.

The starch content of compositions according to the invention is preferably low, suitably below about 20% by weight of the composition. Feed stuffs which comprise high amounts of fat and fibre and low amounts of starch are especially preferred as components of compositions of the invention. An example is rice bran.

Suitable stomach antacids for use in compositions and methods of the invention may act by neutralising stomach acid or by inhibiting secretion of acid into the stomach. Any alkali which neutralises stomach acid and can be safely administered to an animal may be used. Suitable antacids

- 7 -

which act by neutralising stomach acid include Neigh-Lox and prostaglandin analogues. The active ingredients in Neigh-Lox are dihydro-aluminium sodium carbonate and aluminium phosphate. Suitable antacids which inhibit acid secretion in the stomach include proton pump inhibitors and histamine type-2 antagonists which block histamine-stimulated gastric acid secretion. Substituted benzimidazoles, such as omeprazole, act as proton pump inhibitors. Cimetidine and ranitidine are examples of Histamine type-2 antagonists.

It is believed that once an animal has learnt a stereotypy, the stereotypic behaviour becomes fixed and the animal will perform the stereotypy even if the original cause of the behaviour has been removed. Consequently, the animal should be treated using a composition or method according to the invention before any stereotypic behaviour becomes fixed, and preferably before, or soon after, the animal develops any stereotypic behaviour.

Acidity in the stomach is thought to increase when animals are fed meals of grain or are subjected to extended periods of fasting. Stomach pH may also decrease when the diet of an animal changes during weaning. Consequently, an animal should be treated with a composition or method according to the invention shortly before and/or during and/or following eating a high grain diet, undergoing a period of extended fasting, or weaning. Treatment at these times may be particularly effective in preventing, treating, or ameliorating animal stereotypy.

In order to minimise the risk of an animal developing a stereotypy, the animal may be treated with a composition or method according to the invention from birth.

Compositions and methods of the invention may also be effective when the animal being treated is a weaned animal.

It is considered that compositions according to the invention will usually be included with the diet of an animal being treated according to the invention.

- 8 -

Compositions according to the invention may be included in the diet of the animal's mother while she is lactating. This is because the mother's diet influences the nutritional content of the milk which the animal receives and because  
5 the animal may eat its mother's feed before it is weaned; foals invariably eat their dam's feed before they are weaned.

Compositions according to the invention may be included in feed and the said feed fed to the animal as it is being  
10 weaned onto solid food.

Compositions according to the invention may be included in the animal's diet post weaning.

The invention is further described by the following embodiment. The embodiment relates to use of stomach  
15 antacid to treat, ameliorate, or prevent crib biting in horses.

### **Example**

### **20 Methods**

Advertisements were placed for foals to take part in the study. Foals offered for the study were rejected if the foal had been crib-biting for more than 20 weeks, was more  
25 than 1 year of age, or if the owner had attempted to prevent crib-biting using surgery or electric shock treatments.

Foals chosen for the study were visited at times when the owners had previously noted crib-biting behaviour. They  
30 were observed for a minimum of 1 hour to establish that they were performing crib-biting behaviour. It was clear from the observations that some owners had mistaken wood-chewing for crib-biting.

35 A crib-biting horse grasps a fixed object with its incisor teeth, arches its neck, and pulls back (often but not always

- 9 -

emitting a grunting sound). There is no ingestion of wood, or other substrate. The behaviour is invariant in form - it tends to occur in the same place, or perhaps 2 or 3 favoured sites, within the stable, at the same time in a sequence of  
5 behaviour (for example a horse may grasp a piece of hay, move to the front of its stable, then crib-bite), and at the same times of day (for example just after feeding). The crucial part of crib-biting is arching of the neck which puts considerable tension on the neck muscles, and affects  
10 the oesophagus and pharynx.

Wood chewing is completely different and cannot be distinguished in form from normal chewing at hay, straw or bark. Wood or other material is ingested and chewed. The  
15 wood or material may or may not be swallowed. The horse is not tense during this behaviour. A horse will perform wood-chewing in a variety of places (wherever a new bit of wood can be found), and does not perform the behaviour as part of a fixed sequence of behaviour.

20 Those foals observed to be wood-chewing were rejected from further study. The remaining foals were randomly allocated to a feed treatment, and their owners were provided with an initial supply of the diet for that treatment and asked to  
25 gradually change their foals onto this diet over the subsequent week.

In total, 13 crib-biting foals and 8 control foals (belonging to 13 different owners) were recruited.  
30 Comparisons were made between the two populations and are summarised in Table 1.

- 10 -

**Table 1 General Characteristics of Study Population**

		Crib-biting foals		Normal foals	
		mean	se	mean	se
5	Age at entry (days)+	233.7	9.21	291.2	47.45
	Age at weaning (days)	172.38	9.00	183.62	15.20
	Age when concentrate				
	introduced (days)	40.0	18.1	51.2	29.80
	Amount of concentrate	2.64	0.30	2.61	0.40
10	fed prior to entry				
	(kg)				

+ Entry into the study was taken as the first date on which  
 15 detailed behaviour observations were taken

Crib-biting foals had developed crib-biting behaviour at an  
 average of 152.5 (se 20.3) days of age, or 21.8 weeks. A  
 proportion of the foals had developed oral stereotypy prior  
 20 to weaning. They had been performing stereotypic behaviour  
 for a mean 88.7 (se 13.3) days, or 12.7 weeks, prior to  
 entry into the study.

### Treatments

25 Six crib-biting and four control foals were allocated to a  
 typical base diet containing cereals (wheat, barley, oats),  
 wheatfeed, soya bean meal, peas, full fat linseed, vitamin  
 and mineral supplements, and molasses. This base diet was  
 30 supplemented with forage (fresh or preserved). This is Diet  
 A. This diet was re-bagged before delivery to the owners  
 and was fed according to body weight.

35 Seven crib-biting and three control foals were allocated to  
 an antacid diet. This was Diet A, re-bagged and supplied  
 with a tub of Neigh-Lox. Owners were asked to feed



- 11 -

approximately 125g of Neigh-Lox per day, divided equally among feeds.

5 One control foal for which initial samples and endoscopy results were obtained was not placed on a diet as its crib-biting partner moved to a different yard.

#### **Behavioural Observations**

10 Participants were visited regularly throughout the trial. Owners were asked to ensure that their foal was in an environment where it had been observed crib-biting for at least one hour before the behaviour recordings were started. The time of day, and time in relation to meal-time, that  
15 observations were taken varied among foals, but was generally held constant for each foal in the study across repeated visits.

#### **Endoscopy**

20 Foals were endoscoped during the first week of the trial, and a week after the trial had ended. All foals were deprived of all feed and forage for a period of 12 hours overnight and endoscoped between 0900 and 1030 hours the  
25 next morning. During endoscopy. A continuous video record was made of the glandular and squamous mucosa. Samples of gastric fluid were taken and the pH measured. The veterinarian performing the endoscopy then provided a written description of his observations. An independent  
30 observer who was not given information about which horses were crib-biters, or about which feed treatment they had received also prepared a descriptive account from the video recordings. This was compared and the written description prepared at the time by the veterinarian. The information  
35 was summarised according to an agreed scoring system.

- 12 -

## RESULTS

Baseline correlations among variables and differences between crib-biting and normal foals at the start of the trial.

### (i) General Characteristics

None of the normal foals started to crib-bite during the trial.

There were no significant differences between crib-biting and normal foals in any of the general population parameters, although despite very small numbers, there was a trend towards an association between crib-biting and previous administration of antibiotics.

### (ii) Endoscopy

Endoscopy records were obtained for 10 crib-biting and 4 control horses at the start of the trial.

Ulcers were observed in 6 foals at the start of the trial. The ulcers were few in number and generally mild, with the exception of 1 crib-biting foal that had extensive ulceration. The crib-biting foals had higher scores for number of bots, severity of ulcers and inflammation than the normal foals at the start of the trial, and lower scores for stickiness of the mucosa, black flecks on the mucosa, corrugations of the squamous mucosa and folding of the glandular mucosa. The squamous mucosa and glandular mucosa were also less moist in crib-biting than normal foals.

The mean pH of the gastric fluid samples taken from 5 crib-biting foals on the first endoscopy visit was 1.69 with a range between 1.43 and 2.00.

- 13 -

**Treatment Effects****(i) Behaviour**

The data on frequency and duration of crib-biting is shown in Tables 2 and 3. It should be noted that the management of some of the foals changed during the course of the study. These foals were No. 1: in all the time (observations 1 and 2) to out all the time (observation 3); No. 3: in at night or in all of the time if wet (observations 1 and 2) to out all of the time (observation 3); and No. 13: hay fed as forage (observations 1 and 2) to haylage fed as forage (observation 3). The third observation period for these 3 foals was therefore not used in analysis.

**Table 2 The frequency of crib-biting (mean bites per hour) exhibited during the trial**

Foal	Diet	Obs period 1	Obs period 2	Obs period 3
1	Control	187.3	85.5	(3.8)
2	Control	5.5	0.0	0.0
3	Control	220.0	449.0	(225.0)
4	Control	48.4	2.5	0
5	Control	11.5	0.5	3.25
6	Control	62.7	70.0	73.5
7	Neighlox	4.5	0.5	0.0
8	Neighlox	60.5	478.5	155
9	Neighlox	285.3	204.9	223
10	Neighlox	111.5	47.7	Deceased
11	Neighlox	30.0	16.3	9.00
12	Neighlox	13.5	20.5	13.9
13	Neighlox	41.25	16.75	(100)

- 14 -

Table 3 - The duration of crib-biting (mean seconds per hour) exhibited during trial

	Foal	Diet	Obs period 1	Obs period 2	Obs period 3
5	1	Control	894.5	821.5	(22)
	2	Control	41.5	0.0	0.0
	3	Control	976.0	2326.0	(691.0)
	4	Control	278	23.3	0
	5	Control	148	8.3	18.0
10	6	Control	599.7	574.5	674
	7	Neighlox	89.2	5.0	0.0
	8	Neighlox	364.8	2328.5	1007.0
	9	Neighlox	1767.0	945	1278
15	10	Neighlox	455.5	172.2	Deceased

- 15 -

The change in crib-biting frequency and duration was assessed by taking the slope of the values over the 3 month period. Four of the 13 crib-biting foals had positive slope values for both frequency and duration, indicating an overall increase in crib-biting behaviour during the trial. The remaining slopes were all negative.

Each foal was then ranked according to its change in behaviour over time, relative to the other foals in the study. The two measures of frequency and duration resulted in slightly different rank orderings of the foals. For both measures rank order 1 indicates the foal that showed the largest decline in crib-biting, and rank order 13 indicates the foal that showed the largest increase in crib-biting. The rankings are shown in Table 4 and were used to examine associations between stomach condition and behavioural change.

**Table 4 Rank ordering of foals according to change in crib-biting behaviour during trial**

Foal	Rank Order for frequency	Rank order for duration
1	1	5
2	8	9
3	13	13
4	5	3
5	7	6
6	11	11
7	9	7
8	12	12
9	3	2
10	2	1
11	6	4

- 16 -

Foal	Rank Order for frequency	Rank order for duration
12	10	10
13	4	8

## 5 (ii) Endoscopy

Valid endoscopy records were obtained for 8 crib-biters and 3 normal horses. Positive correlations were obtained between the presence of ulcers and the presence of bots, between the presence of bots and inflammation of the mucosal surface, and between the presence of ulcers and inflammation of the mucosal surface.

The crib-biting foals had higher scores for number of bots, number of ulcers, and inflammation than the normal foals, and lower scores for stickiness of the mucosa, corrugations of the squamous mucosa and foling of the glandular mucosa, results that were very similar to the starting conditions. However, in contrast to the start of the trial the squamous mucosa and glandular mucosa were moister in crib-biting than normal foals.

Data from crib-biting and normal horses were combined and subjected to analysis to examine the effects of dietary treatment on stomach condition. At the end of the trial, horses that had received Neigh-Lox had fewer ulcers and less inflammation than horses that had received the control diets. Eight horses had noticeable ulcers at the start of the trial. Those with mild ulcers that were fed Neighlox all resolved by the end of the trial. Those with moderate or severe ulcers that were fed Neigh-Lox either showed no improvement or got worse. The ulcers of horses that were fed the control diet showed no change or got worse; none of these ulcers resolved spontaneously.

- 17 -

5 The relationship between ulcers and crib-biting behaviour was examined by comparing the extent to which crib-biting changed over the course of the trial, with the severity of ulcers present at the end of the trial. Horses whose ulcers did not heal during the course of the trial were also the horses that showed little or no reduction in crib-biting behaviour.

10 The results presented here demonstrate for the first time a relationship between stomach condition and abnormal oral behaviour in the horse and are consistent with crib-biting being an adaptive attempt to reduce stomach acidity. Crib-biting foals tended to have more bots and ulcers, a drier and more expanded stomach wall, and a greater degree of  
15 inflammation than normal foals. The general appearance of the stomach of the crib-biting foals supports the hypothesis that their stomachs are more acid. The results also show that an improvement in stomach condition was associated with reduced crib-biting behaviour. Administration of Neigh-Lox  
20 was associated with a resolution of mild ulceration. Foals whose mild ulceration cleared showed the greatest improvement in crib-biting. In some of these foals crib-biting ceased altogether.

25 The cause of the stomach problems in crib-biting foals is not clear. Candidate factors include:

- The early introduction of concentrate feed.

30 Most of the crib-biting foals in the study had received concentrate feed from birth, or during the pre-weaning period. It is known from other work that concentrate feed increases gastric acidity, and causes ulceration.

- Previous illness or use of antibiotics.

35 The owners of some foals reported that they had started crib-biting during a period of illness or after receiving antibiotics. Illness may involve confinement and separation and foals may not feed properly during such periods.

- 18 -

Alternatively, antibiotics may have a more direct effect in disrupting the flora of the hindgut.

- Sustained effects originating at weaning.

Weaning by methods that are particularly stressful increases the rate of development of stereotypies dramatically. Stressed foals are unlikely to eat, and feed deprivation is known to increase gastric acidity.

- Differential production of saliva.

It is possible that there is variation among foals in the extent to which they release saliva, either spontaneously or during feeding. The production of a limited supply of saliva may cause or enhance stomach acidity. The foals that do the most crib-biting may be the ones that most need to produce saliva and are most frustrated by their inability to do so in sufficient quantities.

The data presented in the example demonstrate the effectiveness of a stomach antacid on the prevention, treatment, or amelioration of equine crib-biting. This activity is thought to be enhanced by the inclusion in compositions according to the invention of fat and fibre.

Compositions and methods according to the invention may be particularly effective at preventing stereotypy when the animal being treated is a weaning or recently weaned animal. Foals are typically weaned when they are four to six months old.

Use of compositions and methods according to the invention may be particularly effective in the amelioration, treatment or prevention of any stereotypy in all equidae, non-ruminant herbivores, and non-ruminant omnivores, for example crib-biting, wind-sucking, weaving and box-walking in equine animals.

Use of compositions and methods according to the invention may be particularly effective in the amelioration, treatment or prevention of stereotypies linked with gut function in all equidae, non-ruminant herbivores, and non-



- 19 -

ruminant omnivores, but especially in the amelioration, treatment or prevention of equine crib-biting.

5 The reason that compositions and methods according to the invention may be particularly effective in the amelioration, treatment or prevention of animal stereotypy is not known. However, the realisation that low stomach pH is linked with stereotypic behaviour suggests that pain caused by low stomach pH may cause the animal to perform a stereotypy, such as crib-biting, to stimulate the flow of  
10 saliva into the stomach. This saliva would be expected to increase the stomach pH and alleviate the pain. The fact that significant numbers of horses develop stereotypic behaviour during the immediate post-weaning period may be because the diet of a foal changes significantly during weaning. If such a dietary change results in a persistent  
15 decrease in stomach pH, then stereotypic behaviour may be more likely to occur. Administration of compositions according to the invention to an animal, especially a weaning or recently weaned animal, may ensure that its stomach pH is not persistently low and remove, therefore,  
20 the need for the animal to stimulate the flow of saliva into the stomach. It is believed that the fibre may help to prolong the time spent chewing by an animal. This in turn prolongs the production of saliva which neutralises stomach acid. The fat is thought to delay emptying of the stomach so  
25 that the beneficial effect of the antacid and/or fibre is prolonged.

30 Compositions according to the invention may act by preventing or reducing stomach ulcer formation caused by prolonged periods of low stomach pH, or by treating stomach ulcers already formed.

35 Compositions and methods according to the invention may be significantly more effective in the treatment and prevention of animal stereotypy than prior treatments and preventatives. In addition, treatment of animals using compositions and methods according to the invention does not

- 20 -

involve any undesirable practices being performed on the animal.

- 21 -

Claims

1. A composition for use in the treatment, prevention or amelioration of animal stereotypy which comprises fat, fibre, and optionally a stomach antacid.

2. A pharmaceutical composition for use in the treatment, prevention or amelioration of animal stereotypy which comprises fat, fibre, and optionally a stomach antacid, together with a pharmaceutically acceptable carrier, excipient or diluent.

3. A composition according to claim 1 or 2 in which the amount of fat in the composition is from about 5% to about 20%, preferably from about 8% to about 17%, by weight of the composition.

4. A composition according to any preceding claim in which the amount of crude fibre in the composition is from about 3.5% to about 35%, preferably from about 10% to about 25%, by weight of the composition.

5. A composition according to any preceding claim in which the amount of neutral detergent fibre in the composition is from about 15% to about 70%, preferably from about 25% to about 50%, by weight of the composition.

6. A composition according to any preceding claim in which at least some of the fibre is chopped fibre.

7. A composition according to claim 6 in which at least some of the chopped fibre is about 1-7cm long.

8. A composition according to any preceding claim in which the starch content of the composition is low, preferably below about 20% by weight of the composition.

- 22 -

9. A composition according to any preceding claim in which the antacid inhibits secretion of acid in the stomach.

5 10. A composition according to claim 9 in which the antacid is a proton pump inhibitor such as omeprazole, or a histamine type-2 antagonist.

10 11. A method of treatment, prevention or amelioration of animal stereotypy which comprises controlling the stomach pH of an animal.

15 12. A method according to claim 11 in which the stomach pH of the animal is controlled before any stereotypic behaviour performed by the animal becomes fixed.

13. A method according to claim 11 in which the stomach pH of the animal is controlled before, or shortly after, it develops any stereotypic behaviour.

20 14. A method according to claim 11, 12 or 13 in which the animal is a weaning, or recently weaned animal.

25 15. A method according to claim 11, 12 or 13 in which the animal is a weaned animal.

16. A method according to any of claims 11 to 14 in which the stomach pH of the animal is controlled from birth.

30 17. A method according to any of claims 11 to 16 in which the stomach pH of the animal is controlled by inhibiting secretion of acid in the stomach of the animal.

35 18. A method according to claim 17 in which the acid secretion is inhibited by administering a proton pump inhibitor, such as omeprazole, or a histamine type-2 antagonist to the animal.

- 23 -

19. A method according to any of claims 11 to 18 in which the stomach pH of the animal is controlled by administering a composition according to any of claims 1 to 10 to the animal.

5

20. A method according to claim 19 in which the composition is included in the animal's diet from birth.

10

21. A method according to claim 19 or 20 in which the composition is included in the diet of the animal's mother when she is lactating.

15

22. A method according to any of claims 19 to 21 in which the composition is included in feed and the said feed is fed to the animal as it is being weaned.

20

23. A method according to any of claims 11 to 22 in which the stomach pH of the animal is controlled shortly before and/or during and/or following weaning, ingestion of a high grain diet, or a period of extended fasting by the animal.

25

24. A method of treatment, prevention or amelioration of animal stereotypy which comprises preventing or reducing ulcer formation, or treating ulcers formed in the stomach of an animal.

30

25. A method according to claim 24 in which ulcer formation is prevented or reduced, or ulcers are treated, by administering a composition according to any of claims 1 to 10 to the animal.

35

26. Use of a composition comprising a stomach antacid in the manufacture of a medicament for the amelioration, treatment, or prevention of animal stereotypy.

- 24 -

27. Use of a composition according to any of claims 1 to 10 in the manufacture of a medicament for the amelioration, treatment or prevention of animal stereotypy.

5 28. A method according to any of claims 11 to 25 or use according to claim 26 or 27 in which the animal is an *equidae*, a non-ruminant omnivore, or a non-ruminant herbivore.

10 29. A method or use according to claim 28 in which the animal is a horse.

30. A method or use according to claim 29 in which the stereotypy is crib-biting.

15

31. A composition substantially as described.

32. A pharmaceutical composition substantially as described.

20

33. A method substantially as described.

# INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 99/03288

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61K35/78 A23K1/18 A61K31/44 A61K31/34 A61K31/415  
A61K33/10 A61K33/42

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K A23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	L.C. WINSKILL ET AL.: "The effect of a foraging device (a modified 'Edinburgh Foodball') on the behaviour of the stabled horse" APPLIED ANIMAL BEHAVIOUR SCIENCE, vol. 48, no. 1-2, 1996, pages 25-35, XP002094083 * pages 25-26, Abstract * page 28, paragraph 1 page 32, paragraph 2 -page 34, paragraph 3  — —/—	1,2,4, 27,31-33

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 January 2000

Date of mailing of the international search report

28/01/2000

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>WO 96 20709 A (ROWE JAMES BABER) 11 July 1996 (1996-07-11) cited in the application</p> <p>page 1, line 37 -page 2, line 2 page 2, line 24 - line 28 page 13, line 19 - line 24 figures 1-5 examples 1-4</p>	<p>1,2, 11-16, 19-23, 26-33</p>
Y		<p>9,10,17, 18</p>
X	<p>WO 96 31213 A (MERCK &amp; CO INC ;DAVE KAUSHIK J (US); WILLIAMS JAMES B (US)) 10 October 1996 (1996-10-10) the whole document</p>	<p>24</p>
Y		<p>9,10,17, 18</p>
X	<p>K.G. JOHNSON ET AL.: "Behavioural changes in stabled horses given nontherapeutic levels of virginiamycin" EQUINE VETERINARY JOURNAL, vol. 30, no. 2, 1998, pages 139-143, XP002094082 GB cited in the application * page 139, Summary * page 139, column 2, paragraph 2 - paragraph 3 page 140, column 1, paragraph 2 - paragraph 3 page 142; figures 2,3 page 142, column 1, paragraph 3 - paragraph 4 page 142, column 2, paragraph 2 -page 143, column 1, last paragraph</p>	<p>1,2, 11-16, 19-23, 26-33</p>
X	<p>J.G. WILLARD ET AL.: "Effect of diet on cecal pH and feeding behavior of horses" JOURNAL OF ANIMAL SCIENCE, vol. 54, no. 1, 1977, pages 87-92, XP002094085 US cited in the application the whole document</p>	<p>1,2,11, 26-33</p>
	-/-	



# INTERNATIONAL SEARCH REPORT

Int. l. Application No.

PCT/GB 99/03288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>I. REDBO ET AL.: "Factors affecting behavioural disturbances in race-horses"  ANIMAL SCIENCE,  vol. 66, no. 2, 1998, pages 475-481,  XP002094084  GB  * page 475, Abstract *  page 477, column 1, paragraph 5  page 478; table 2  page 479, column 1, paragraph 2  page 479, column 2, paragraph 2 -page 480,  column 2, paragraph 1</p>	1,2, 27-33
X	<p>GB 1 097 955 A (SMITH KLINE &amp; FRENCH  LABORATORIES) 3 January 1968 (1968-01-03)  page 1, line 13 - line 20  page 1, line 46 - line 59</p>	11,26-33
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X	<p>EP 0 797 929 A (KOHJIN CO)  1 October 1997 (1997-10-01)  page 2, line 15 - line 18  claim 1</p>	24
Y		25
Y	<p>GB 2 200 027 A (RIN RIN INTERNATIONAL  CORP) 27 July 1988 (1988-07-27)  page 1, line 20 -page 2, line 8  page 5, line 7 - line 28</p>	25
A	<p>L. WINSKILL ET AL.: "Stereotypies in the  stabled horse : Causes, treatments and  prevention"  CURRENT SCIENCE,  vol. 69, no. 4, 1995, pages 310-316,  XP002094086  page 312, column 1, paragraph 2 -column 2,  paragraph 1  page 313, column 1, last paragraph -column  2, paragraph 1</p>	1,2, 11-16, 19-23, 26-33
	-/-	

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>P. MCGREEVY ET AL.: "Physiological and behavioral consequences associated with short-term prevention of crib-biting in horses"</p> <p>PHYSIOLOGY &amp; BEHAVIOR, vol. 65, no. 1, 1998, pages 15-23, XP002094087 GB</p> <p>page 19, column 1, last paragraph -column 2, paragraph 1 page 20, column 2, paragraph 2</p>	<p>1,2, 27-33</p>

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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GB 2200027 A	27-07-1988	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>39766</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 99/ 03288</b>	International filing date (day/month/year) <b>06/10/1999</b>	(Earliest) Priority Date (day/month/year) <b>06/10/1998</b>
Applicant <b>MARS U.K. LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61K35/78 A23K1/18 A61K31/44 A61K31/34 A61K31/415  
 A61K33/10 A61K33/42

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61K A23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>L.C. WINSKILL ET AL.: "The effect of a foraging device (a modified 'Edinburgh Football') on the behaviour of the stabled horse"</p> <p>APPLIED ANIMAL BEHAVIOUR SCIENCE, vol. 48, no. 1-2, 1996, pages 25-35, XP002094083</p> <p>* pages 25-26, Abstract *</p> <p>page 28, paragraph 1</p> <p>page 32, paragraph 2 -page 34, paragraph 3</p> <p>---</p> <p>-/--</p>	1,2,4, 27,31-33

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

18 January 2000

Date of mailing of the international search report

28/01/2000

Name and mailing address of the ISA

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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 96 20709 A (ROWE JAMES BABER) 11 July 1996 (1996-07-11) cited in the application  page 1, line 37 -page 2, line 2 page 2, line 24 - line 28 page 13, line 19 - line 24 figures 1-5 examples 1-4	1,2, 11-16, 19-23, 26-33
Y	---	9,10,17, 18
X	WO 96 31213 A (MERCK & CO INC ;DAVE KAUSHIK J (US); WILLIAMS JAMES B (US)) 10 October 1996 (1996-10-10) the whole document	24
Y	---	9,10,17, 18
X	K.G. JOHNSON ET AL.: "Behavioural changes in stabled horses given nontherapeutic levels of virginiamycin" EQUINE VETERINARY JOURNAL, vol. 30, no. 2, 1998, pages 139-143, XP002094082 GB cited in the application * page 139, Summary * page 139, column 2, paragraph 2 - paragraph 3 page 140, column 1, paragraph 2 - paragraph 3 page 142; figures 2,3 page 142, column 1, paragraph 3 - paragraph 4 page 142, column 2, paragraph 2 -page 143, column 1, last paragraph	1,2, 11-16, 19-23, 26-33
X	J.G. WILLARD ET AL.: "Effect of diet on cecal pH and feeding behavior of horses" JOURNAL OF ANIMAL SCIENCE, vol. 54, no. 1, 1977, pages 87-92, XP002094085 US cited in the application the whole document	1,2,11, 26-33
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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	I. REDBO ET AL.: "Factors affecting behavioural disturbances in race-horses" ANIMAL SCIENCE, vol. 66, no. 2, 1998, pages 475-481, XP002094084 GB * page 475, Abstract * page 477, column 1, paragraph 5 page 478; table 2 page 479, column 1, paragraph 2 page 479, column 2, paragraph 2 -page 480, column 2, paragraph 1 ---	1,2, 27-33
X	GB 1 097 955 A (SMITH KLINE & FRENCH LABORATORIES) 3 January 1968 (1968-01-03) page 1, line 13 - line 20 page 1, line 46 - line 59 ---	11,26-33
X	WO 98 43644 A (GRANSTROM DAVID ;TOBIN THOMAS (US)) 8 October 1998 (1998-10-08)  page 8, line 1 - line 35 page 9, line 1 - line 20 page 10, line 6 -page 11, line 3 ---	1,2,4, 11,25, 28,29, 31-33
X	WO 96 31239 A (BACHMANN POUL) 10 October 1996 (1996-10-10) example 4 ---	24,25
X	EP 0 797 929 A (KOHJIN CO) 1 October 1997 (1997-10-01) page 2, line 15 - line 18 claim 1 ---	24
Y	---	25
Y	GB 2 200 027 A (RIN RIN INTERNATIONAL CORP) 27 July 1988 (1988-07-27) page 1, line 20 -page 2, line 8 page 5, line 7 - line 28 ---	25
A	L. WINSKILL ET AL.: "Stereotypies in the stabled horse : Causes, treatments and prevention" CURRENT SCIENCE, vol. 69, no. 4, 1995, pages 310-316, XP002094086 page 312, column 1, paragraph 2 -column 2, paragraph 1 page 313, column 1, last paragraph -column 2, paragraph 1 --- -/--	1,2, 11-16, 19-23, 26-33

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03288

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>P. MCGREEVY ET AL.: "Physiological and behavioral consequences associated with short-term prevention of crib-biting in horses"</p> <p>PHYSIOLOGY &amp; BEHAVIOR, vol. 65, no. 1, 1998, pages 15-23, XP002094087 GB</p> <p>page 19, column 1, last paragraph -column 2, paragraph 1 page 20, column 2, paragraph 2 -----</p>	1,2, 27-33



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Information on patent family members

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